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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

K-1825CIP2

Applicant : Jyoji Mishina et al.

Title : AIRBAG

Serial No. : 09/644,793

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Group Art Unit : 3619

Examiner : Christopher R. Buchanan

Hon. Director of Patents and Trademarks
Washington, D. C. 20231

August 29, 2002

APPEAL BRIEF

Sir:

This is an appeal from the final rejection of the Examiner dated February 20, 2002. A check in the amount of $320.00 is attached herewith for the appeal brief fee. The brief is submitted in triplicate.

REAL PARTY IN INTEREST

The applicant is the real party in interest.

RELATED APPEALS AND INTERFERENCES

There is no related appeal and interference.

STATUS OF CLAIMS

Claims 1-16 are pending in the application. Claims 1-16 were rejected finally. Claims 1-16 are at issue.

STATUS OF AMENDMENT

In response to the final Action of February 20, 2002, the amendment after final action was filed on May 9, 2002, to which an advisory action was issued, wherein it was held that the proposed

amendment is not entered because they raises new issues that would require further consideration and/or search.

As a result of the discussion with the Examiner regarding the advisory Action, it was informed that the subject matter of claim 14 can not be entered into claim 1 as was done in the amendment after final Action, but the subject matter of claim 1 can be entered into claim 14, i.e. claim 14 is amended into an independent form.

Therefore, the second amendment after final Action was filed on July 18, 2002, to which an advisory Action was mailed on August 8, 2002, wherein the second amendment would be entered for the purpose of appeal.

SUMMARY OF INVENTION

The present invention relates to an airbag formed of a plurality of panels sewed together. In the airbag formed of a plurality of panels, edges of the panels are sewed together to form a bag. The airbag is assembled with a retainer, inflator and so on, and is attached to a front panel or a steering wheel of an automobile. When the airbag is inflated in an emergency situation, the airbag is inflated and ejected from the panel or steering wheel to protect a driver or occupant of the automobile.

In case the airbag is formed of a plurality of panels sewed together around the edges of the panels by threads, when the airbag is inflated, the panels are pulled and stretched by gas ejected into the airbag. Since the gas pressure in the airbag is high, the gas in the airbag may leak through the seams of the threads. In order to prevent the gas leakage, as shown in Figs. 4a and 4b, conventionally, silicone tapes were attached over the seams. Even if the silicone tapes were provided on the edges of the airbag to cover the seams, the gas may leak between the panels. Therefore, the conventional silicon tapes are not practical in forming the airbag.

In view of the problems in the conventional airbags, the present invention has been made.

In claim 1 of the application, an airbag comprises a first panel and a second panel, elastic adhesive, and a yarn. The first and second panels have peripheral portions having inner surfaces facing

and connected to each other. The elastic adhesive is disposed between the inner surfaces of the first and second panels at the peripheral portions to connect the first and second panels. The yarn is sewed along the peripheral portions within a range of the width of the elastic adhesive to connect the first and second panels together with the elastic adhesive. Thus, when the first and second panels are pulled in inflating the airbag, the adhesive is pulled outwardly to absorb an expansion force.

The above structure and operation are described on page 5, line 23 to page 6, line 9 of the specification, and shown in Figs. 1a-1c. Namely, the first panel 1 and second panel 2 are adhered together by an adhesive 5 at the peripheral portions thereof, and the peripheral portions are sewed by a yarn, i.e. sewing yarns 6A, 6B within the range of the width W. When the airbag is inflated, the adhesive is pulled or stretched outwardly while being adhered to the panels 1, 2. Since the adhesive adhered to the panels 1, 2 is pulled in inflating the airbag, the expansion force of the panels is absorbed by the adhesive.

In claim 7 which depends from claim 1, it is defined that the yarn comprises a first seam positioned outside and a second seam positioned inside relative to a center of the first and second panels, and a sewing yarn 6A for the second seam is thinner than a sewing yarn 6A for the first seam. Since the yarns for the first and second seams are different, as recited in claim 8, the sewing yarn 6A for the second seam is broken during inflation of the airbag so as to partially absorb energy of the gas pressure. This structure is explained on page 6, line 18 to page 7, line 6 of the specification, and shown in Fig. 2.

In claim 14, which is an independent claim, in addition to the basic structure as explained in claim 1, it is defined that the adhesive is adhered not only to the peripheral portions of the panels where they are sewn each other but also to a neighborhood thereof inside the airbag so that when the first and second panels are pulled in inflating the airbag, the elastic adhesive in the neighborhood is pulled outwardly to absorb an expansion force and stress applied thereto.

The above structure in claim 14 clearly shows the structure in Figs. 1b, 1c and 2, i.e. the yarn is located inside the width W of the adhesive. Since the adhesive is provided outside the yarn, in inflating the airbag, the adhesive is pulled first to absorb the expansion force and stress applied to the panels.

In sum, in the invention, the peripheral portions of the first and second panels are connected by the elastic adhesive at the inner surfaces thereof, and the yarn sewed within the range of the width of the elastic adhesive. Therefore, when the airbag is inflated, the elastic adhesive is elastically pulled outwardly to properly absorb the expansion force of the airbag, and the first and second panels are securely connected together without gas leakage.

If the peripheral portions are only sewed by the yarn, the expansion force of the airbag is not absorbed, and the gas may leak through the sewed portion. Also, when the peripheral portions are only joined by the elastic adhesive, if a large force is applied to the peripheral portion, the airbag may be torn easily.

In the invention, since the peripheral portion is connected by the adhesive and the yarn, the leakage of the gas and breakage of the airbag can be prevented. Also, the impact of the airbag when inflated or being collided with a passenger can be absorbed.

ISSUE

(1) whether claims 1-4, 7-13, 15 and 16 are unpatentable under 35 U.S.C. 103(a) over Saderholm et al. in view of Hirai.

(2) whether claims 5, 6 and 14 are unpatentable under 35 U.S.C. 103(a) over Saderholm et al. in view of Hirai and Gray et al.

GROUPING OF CLAIMS

Claims should be grouped separately to (1) claims 1-4, 9-13, 15 and 16, wherein claim 1 is contested, (2) claims 7 and 8, wherein claim 7 is contested, and (3) claims 5, 6 and 14, wherein claim 14 is contested.

ARGUMENT

(1) Whether claims 1-4, 9-13, 15 and 16 are unpatentable under

35 U.S.C. 103(a) over Saderholm et al. in view of Hirai.

In Saderholm et al., an airbag has two modes of deployment, i.e. a normal mode and other mode. The airbag is formed of three panels 10, 11, 12 firmly connected together along the peripheries, i.e. outer seam 17. The inner panel 11 has an opening 16 and vents 26, and is connected to the upper panel 10 at a seam 23 and to the lower panel 12 at a seam 21. The panel 12 has a mouth 13 for receiving a gas, and an area 25 made of a gas permeable material.

In the normal mode, when the airbag is inflated, at first, the front and inner panels 10, 11 are expanded outwardly. As the gas pressure increases, the seam 23 between the front and inner panels 10, 11 is broken. As a result, the front panel 10 is expanded further outwardly, and the inner panel 11 is disposed on the lower panel 12 to close the area 25 not to release the gas from the airbag.

In the other mode, such as a driver is located too close to the airbag, after the front and inner panels 10, 11 are expanded, the airbag contacts the driver. As a result, the seam 23 is not broken to restrict expansion of the front panel 10. Gas in the airbag is released through the area 25.

In claim 1 of the application, the elastic adhesive is disposed between the inner surfaces of the first and second panels at the peripheral portions to connect the first and second panels thereat. In Saderholm et al., although the outer peripheries of the panels 10-12 are sewed together by the outer seam 17 (column 3, lines 41-44 of Saderholm et al.), no adhesive is provided between the inner surfaces of the panels.

In claim 1 of the application, also, the yarn is sewed along the peripheral portions of the first and second panels within the range of the width of the elastic adhesive to connect the first and second panels together with the elastic adhesive. As explained above, in Saderholm et al., the adhesive is not applied around the peripheries of the panels 10-12. Therefore, in Saderholm et al., although the outer seam 17 connects the panels 10-12, the outer seam 17 is not located within the range of the width of the elastic adhesive.

In claim 1 of the application, further, when the first and second panels are pulled in inflating the airbag, the adhesive is also pulled

outwardly to absorb the expansion force. In Saderholm et al., when the airbag is inflated, the inflation force is directly applied to the seams 21, 23. In the normal mode, the seam 23 is broken and the upper panel 10 expands further outwardly, and in the other mode, the seams 21, 23 are not broken. In Saderholm et al., since the adhesive is not formed between the first and second panels, the adhesive does not absorb the expansion force, as in claim 1 of the application.

In Saderholm et al., although the panels for constituting the airbag are sewed along the outer peripheries, the features of claim 1 of the application are not disclosed or even suggested.

Hirai is directed to a resin airbag, which is formed of front and rear panels 2, 3 with different sizes, and adhesive resin 5 for connecting the front and rear panels 2, 3. The adhesive resin 5 is deposited on an end face 2s, an inner surface 2i, an end face 3s and an outer surface 3a to connect the two panels 2, 3 (column 2, lines 8-13 of Hirai).

In forming the resin airbag, the front panel 2 and the rear panel 3 are pushed by pins 14, and the resin from a land 9 also pushes the rear panel 3 to the front panel 2. Therefore, the adhesive resin 5 never flows between the panels (column 2, lines 59-64 of Hirai).

In claim 1 of the application, the inner surfaces of the peripheral portions of the first and second panels face and are connected to each other. In Hirai, the inner surfaces of the front and rear panels 2, 3 face each other, but the inner surfaces are not connected to each other. The front and rear panels 2, 3 are connected only by the adhesive resin 5 disposed at side portions of the panels 2, 3.

In claim 1 of the application, also, the elastic adhesive is disposed between the inner surfaces of the first and second panels at the peripheral portions to connect the first and second panels. In Hirai, although the adhesive resin 5 is used to connect the two panels, the adhesive resin 5 is applied on the outer surfaces of the two panels 2, 3, not deposited between the inner surfaces of the two panels (column 2, lines 63-64 of Hirai).

In claim 1 of the application, further, the yarn is sewed along

the peripheral portion within the range of the width of the elastic adhesive. In Hirai, a yarn is not used to connect the front and rear panels 2, 3.

In the invention, since the adhesive is applied between the inner surfaces of the first and second panels, when the first and second panels are pulled in inflating the airbag, the adhesive is pulled outwardly to absorb an expansion force of the airbag. In Hirai, since the adhesive is not deposited between the panels, the adhesive does not operate to absorb the expansion force when the airbag is inflated, as in claim 1 of the invention.

Although Hirai uses the adhesive to connect the two panels together, Hirai does not disclose or even suggest the features of the invention.

In case Saderholm et al. and Hirai are referred to, the adhesive 5 of Hirai may be applied to the peripheries of the panels 10-12 of Saderholm et al. In this case, as explained before, since the adhesive 5 of Hirai is only applied to the outer surfaces of the panels 2, 3, in combining Saderholm et al. and Hirai, the adhesive 5 of Hirai may be simply applied to the outer peripheries of the panels of Saderholm et al. However, such a combination does not constitute the structure of claim 1 of the application. In claim 1 of the application, the adhesive 5 must be disposed between the inner surfaces of the first and second panels. This structure is not disclosed or suggested even if Saderholm et al. and Hirai are combined. Also, the combination of the two cited references does not disclose or suggest that the yarn is sewed along the peripheral portions within the range of the width of the adhesive. Accordingly, even if Saderholm et al. and Hirai are combined, claim 1 of the application is not obvious from the two cited references.

In the final Action from page 3, line 2 from the bottom to page 4, line 16, the applicant's prior art shown in Fig. 4b and Japanese Publication 10-102029 were referred to. Since the rejections for the claims were formally made by Saderholm et al. and Hirai on page 2 of the final Action, the prior art in Fig. 4b and Japanese Publication

(JP '029) need not be referred to. However, the different of claim 1 with respect to Fig. 4b and JP '029 is explained below.

In the prior art as shown in Figs. 4a and 4b of the application, the panels 1', 2' are joined together by threads or seams 3'. In order to prevent the gas leakage through the seams, silicone tapes 4 are applied on the outer surfaces of the panels 1', 2' to cover the seams 3'. When the airbag is inflated, there is a possibility of gas leakage through a clearance between the panels 1', 2' (page 2, lines 2-8 of the specification). The adhesive tapes 4 simply cover the seams 3', and do not operate to connect the inner peripheries of the panels 1', 2'. In claim 1 of the application, the adhesive is disposed between the inner surfaces of the first and second panels, but such a structure is not disclosed or suggested in Figs. 4a and 4b of the prior art of the application. Thus, the features of the invention are not disclosed or suggested in the prior art of Figs. 4a, 4b.

In regard to claim 1, in case the prior art of Figs. 4a and 4b is further considered in addition to Saderholm et al. and Hirai, the adhesive as disclosed in Hirai may be applied to the outer peripheries of the panels as disclosed in Saderholm et al., on which the silicone tapes 4 are further applied to cover the outer seam 17. However, since cited references do not disclose or suggest that the adhesive is formed between the inner surfaces of the two panels, as clearly recited in claim 1, the combination of the cited references does not constitute the present invention. Claim 1 of the application is not obvious from the cited references.

In JP '029, base fabrics 3, 4 were laminated so that the outer surfaces of the base fabrics 3, 4 face each other while the peripheries thereof are adhered together by hot melt adhesive 7 and are connected by threads 6. In forming the airbag, after the adhesive 7 and threads 6 are formed, a connecting portion 5 is heated and adhered by applying heat and pressure thereto. Then, the bag is inverted such that the inside portions of the bag face outwardly. In JP '029, the adhesive is not applied, as in claim 1 of the application. Also, the amount of adhesive is not disclosed or suggested in the examples and comparative examples, different from the

explanation of the final Action. Even if the cited references are assembled, claim 1 of the application is not obvious from the cited references.

(2) Whether claims 7 and 8 are unpatentable under 35 U.S.C. 103(a) over Saderholm et al. in view of Hirai.

In claim 7, in addition to the structure as defined in claim 1, it is defined that the yarn comprises a first seam positioned outside and a second seam positioned inside relative to a center of the first and second panels, and a sewing yarn for the second seam is thinner than a sewing yarn for the first seam.

In claim 1 from which claim 7 depends, the yarn is sewed along the peripheral portions of the panels within a range of the width of the elastic adhesive. Since the yarn in claim 7 comprises the first and second seams, both seams are located within the range of the width of the elastic adhesive, as defined in claim 1. Since the first and second seams in which the sewing yarns are different in thickness from each other are patentably distinct, claim 7 has patentability separate from claim 1.

In Saderholm et al., the inner seam 23 is located in the middle of the airbag for connecting the front panel 10 and the inner panel 11. The inner seam 23 is broken to release the inner panel 11 from the front panel 10 when the pressure comes to a predetermined level. The outer seam 17 does not break even if high pressure is applied.

In claim 7 in view of claim 1, the first and second seams for forming the yarn are located in the peripheral portions of the panels within the range of the width of the adhesive. In Saderholm et al., the inner seam 23 is located in the middle of the airbag, not the peripheral portion of the panel. Further, the inner and outer seams 23, 17 are not located within the range of the width of the adhesive, which is not formed in Saderholm et al. In this respect, even if the adhesive is formed around the peripheries of the panels, since the inner seam 23 is located in the middle of the airbag, the adhesive should not be formed to extend between the inner and outer seams 23, 17. In addition, if the adhesive extends between the inner and outer seams 23, 17, the adhesive connects the front and inner panels 10, 11,

so that the front panel 10 can not be separated from the inner panel 11 when the pressure increases. Namely, if the adhesive is formed between the inner and outer seams 23, 17, the inner panel 11 does not operate as intended in Saderholm et al.

No other cited references have two yarns or seams, as recited in claim 7. Claim 7 is separately patentable and is not obvious from the cited references.

(3) whether claims 5, 6 and 14 are unpatentable under 35 U.S.C. 103(a) over Saderholm et al. in view of Hirai and Gray et al.

In claim 14, in addition to the basic structure as explained in claim 1, it is clarified that the adhesive is adhered not only to the peripheral portions of the panels where they are sewn each other but also to a neighborhood thereof inside the airbag so that when the first and second panels are pulled in inflating the airbag, the elastic adhesive in the neighborhood is pulled outwardly to absorb an expansion force and stress applied thereto.

As explained before in this section, the structure of claim 1 is not disclosed or suggested in the cited references.

In Gray et al. for rejecting claim 14 in addition to the cited references for rejecting claim 1, a flexible polymerized resin 16 is partly applied to a front panel 8, i.e. parts of inner surfaces of the panels 8, 10. The resins 16 are not formed at the neighborhood of the peripheral portions of the panels where they are sewn each other. Namely, the resins 16 in Gray et al. are formed at portions different from those recited in claim 14. Although the resins 16 are applied to the panels of the airbag, the panels are not formed as recited in claim 14 of the invention. Therefore, Gray et al. does not disclose or suggest the features of claim 14 of the application.

If Gray et al. is further considered in addition to the cited references discussed above, the resin 16 may be formed inside the panels of the airbag, but such a structure does not constitute the airbag of claim 14. Therefore, even if the cited references are combined, claim 14 of the present application is not made. Claim 14 is not obvious from the cited references.

CONCLUSION

As explained above, the cited references do not disclose or even suggest the specific features as recited in claims 1-16 of the application.

It is respectfully requested that the rejections under 35 U.S.C. 103(a) be reversed, and claims 1-16 are allowed.

Respectfully submitted,
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CLAIMS

1. An airbag comprising:

a first panel and a second panel, which have peripheral portions having inner surfaces facing and connected to each other,

elastic adhesive disposed between the inner surfaces of the first and second panels at the peripheral portions to connect the first and second panels, and

a yarn sewed along the peripheral portions within a range of the width of the elastic adhesive to connect the first and second panels together with the elastic adhesive so that when the first and second panels are pulled in inflating the airbag, the adhesive is pulled outwardly to absorb an expansion force.

2. The airbag as claimed in claim 1, wherein said elastic adhesive has elongation of more than 200%.

3. The airbag as claimed in claim 1, wherein said elastic adhesive is silicone adhesive.

4. The airbag as claimed in claim 1,wherein said elastic adhesive is urethane adhesive.

5. The airbag as claimed in claim 1, wherein at least one of said panels is coated with a silicone coating, and said adhesive is silicone adhesive.

6. The airbag as claimed in claim 1, wherein at least one of said panels is coated with a urethane coating, and said adhesive is urethane adhesive.

7. The airbag as claimed in claim 1, wherein said yarn comprises a first seam positioned outside and a second seam positioned inside relative to a center of the first and second panels, a sewing yarn for the second seam being thinner than a sewing yarn for the first seam.

8. The airbag as claimed in claim 7, wherein the sewing yarn for the second seam is broken during inflation of the airbag so as to partially absorb energy of gas pressure.

9. The airbag as claimed in claim 1, further comprising sealant to cover the yarn on the peripheral portions of the panels.

10. The airbag as claimed in claim 1, wherein an amount of the elastic adhesive to be applied is from 0.01g/cm^2 to 0.05g/cm^2.

11. The airbag as claimed in claim 1, wherein the elastic adhesive is room temperature vulcanizing silicone rubber.

12. The airbag as claimed in claim 1, wherein the panels are made of synthetic resin woven fabrics.

13. The airbag as claimed in claim 1, wherein said adhesive stretches with being adhered to the respective panels.

14. An airbag comprising:

a first panel and a second panel, which have peripheral portions having inner surfaces facing and connected to each other,

elastic adhesive disposed between the inner surfaces of the first and second panels at the peripheral portions to connect the first and second panels, and

a yarn sewed along the peripheral portions within a range of the width of the elastic adhesive to connect the first and second panels together with the elastic adhesive, said adhesive being adhered not only to the peripheral portions of the panels where they are sewn each other but also to a neighborhood thereof inside the airbag so that when the first and second panels are pulled in inflating the airbag, the elastic adhesive in the neighborhood is pulled outwardly to absorb an expansion force and stress applied thereto.

15. The airbag as claimed in claim 1, wherein the thickness of the elastic adhesive is uneven.

16. The airbag as claimed in claim 1, wherein the elastic adhesive has a larger thickness at a portion where a larger stress is applies than another portion, whereby the elastic adhesive stretches according to the stress.